REMARKS

Claims 1-6, 10-15, 18, 20, 21, 23-27, and 32-35 are currently pending. Claims 6 and 18 have been amended for clarification and are supported by page 12 of the specification as filed. Claim 10, 34, and 35 have been amended to correct typos. It is respectfully submitted that no new matter has been added.

Claims Rejected under 35 U.S.C. 112, Second Paragraph

Claims 6 and 18 were rejected under 35 U.S.C. 112, second paragraph. Claims 6 and 18 have been amended to recite subject matter found on page 12 of the specification as filed. It is respectfully requested that the Patent Office remove its rejections of claims 6 and 18 under 35 U.S.C. 112, second paragraph.

Claims Rejected under 35 U.S.C. 103(a)

The Patent Office rejected claims 1-4, 11-14, 21, 23-26, and 32-35 under 35 U.S.C. 103(a) as being unpatentable over Matthews, U.S. Patent No. 6,084,858, in view of Verbiest, U.S. Patent No. 4,912,702, and further in view of Larsson, U.S. Patent No. 6,535,498.

Matthews discloses a method for selecting a communication path in distributing a communication load over multiple paths (abstract). Matthews describes the prior art in Figure 1 as a fully meshed network topology having Secure Fast Packet Switches (SFPS) in which each SFPS has four ports; some ports labeled A for access for attachment to end users to provide network access security and connection services and other ports labeled N for attachment to communication devices which group a number of users together (col. 1, lines 50-65). Matthews discloses a solution that is applicable in general to any routing problem in a mesh network such as a communication network, whether or not the network is connection-oriented (col. 4, lines 35-37).

In connection-oriented communications, a logical association is established between the source and the destination, so that several separate groups of data ("a data flow") may be sent along the same path that is defined by the logical association. This is distinguished from connectionless communications, in which the source transmits data to the destination without prior coordination. In connectionless communications, each frame of data is transmitted node-by-node independently of any previous frame. Bridges and routers are commonly used in connectionless communications. (Dobbins, col. 7, lines 48-58; Dobbins incorporated by

reference in Matthews, col. 10, lines 20-24.)

Although Matthews discloses "The solution is applicable in general to any routing program in a mesh network such as a communication network, where or not the network is connection-oriented" (col. 4, lines 34-37), Matthews appears to consider that communications networks which are not connection-oriented (col. 1, lines 38-48) are connectionless (col. 1, lines 22-37). Although Matthews refers to Figure 1 as prior art, Matthews discloses switches (col. 4, lines 25 and 58, col. 5, line 21), routers/ gateways (col. 4, line 59), switching technology (col. 10, line 26), Network Management Server (col. 4, lines 23 and 34, col. 5, lines 22, 43, 52, col. 10, line 18), but does not disclose or suggest wireless communications or openness to modification for use in a wireless communication system.

Contrary to the Patent Office's assertions on page 4, lines 12-16, of the Final Office Action dated November 9, 2006, Verbiest does not disclose or suggest calculating a connectivity metric where the connectivity metric is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. Verbiest discloses calculating the means value and variance of a data packet input stream (col. 5, lines 57-66) and does not, as Matthews and Larsson do not, appear to disclose or suggest calculating a connectivity metric defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. Verbiest does not disclose or suggest a connectivity metric defined as a ratio of a maximum link bandwidth to the estimated link bandwidth, but disclose the output bandwidth B2 is compared against the maximum bandwidth B (col. 5, line 67, through col. 6, line 27) where the maximum bandwidth is a threshold. **Verbiest (col. 1, line 55, through col. 2, line 7) discloses that the estimated output bandwidth of a transmission path is calculated by adding a newly received mean value M to the previously registered sum of the mean values of the input bitstreams already multiplexed on the output terminal, then compares the calculated estimated bandwidth to a threshold level as a percentage of the maximum allowable bandwidth.** This is in contrast to the claimed subject matter of calculating a connectivity metric where the connectivity metric is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. **Verbiest (col. 5, line 67, through col. 6, line 53) discloses calculating an output stream's bandwidth using the output stream's mean value and variance, but does not disclose calculating a connectivity metric where the connectivity metric is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth.**

On page 7, lines 7-10, of the Office Action dated June 16, 2006, and again on page 5, lines 7-10, of the Final Office Action dated November 9, 2006, the Patent Office asserted "it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the method is used in a wireless network, the motivation being in order to facilitate routing in a wireless network by finding the most efficient route for data transmission." This assertion appears to attempt to provide a rationale for modifying Larsson by Matthews; however, Matthews has been designated as the base reference. Matthews, whether connection-oriented or connectionless, appears directed to communication networks with end systems and switches and/or routers in fixed networks and not to ad-hoc wireless networks.

Thus, claims 1-4, 11-14, 21, and 23-26 are allowable over the prior art of record.

The Patent Office rejected claims 10 and 20 under 35 U.S.C. 103(a) as being unpatentable over Matthews, in view of Verbiest and Larsson, and further in view of Hiroyuki, U.S. Published Patent Application No. 2003/0043746.

The Patent Office asserted (page 10, lines 1-12, of the Final Office Action dated November 9, 2006) "Hiroyuki et al disclose that finding an optimum path between nodes in a network comprises using a metric to compare paths. The metric can be the number of hops or the bandwidth, the goal of which is to minimize the metric in choosing a path. Refer to Paragraph 0006 and 0051. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that distributing information concerning the calculated connectivity metric comprises inserting the value of the connectivity metric into a routing protocol packet in conjunction with the value of a hop number, the motivation being that the ratio of maximum link bandwidth link bandwidth to estimated link bandwidth can also be used as a metric to determine the optimum path, in addition to the number of hops. A path is more likely to be selected if its estimated link bandwidth does not exceed the maximum link bandwidth, in order to support the data packet transmission."

Hiroyuki discloses "The Djikstra method is a way to find out a path having a minimum metric between an entrance node used to guide a packet or a like into a network and an exit node used to guide the packet or the like outside the network. The metric is an index used when a path is found on a network and, as the metric, for example, a number of hops (number of nodes through which a packet or a like passes), delay time, bandwidth, costs, or a like are used"

(paragraph 0006) and "In order to surely select the path pair from a network, a constraint condition to obtain two paths and constraint condition required to put these two paths into a state of disjoint relation. Also, if there is a limitation in processing capability (capacity) of a node or a link, a constraint condition to have a metric value in each route fall within a specified range is made necessary. Moreover, if it is necessary to designate a reference (which minimizes, for example, a bandwidth, delay, line cost or a like), on a basis of which the path pair is to be selected" (paragraph 0051).

Neither cited paragraph of Hiroyuki discloses or suggests the limitation of inserting the value of the connectivity metric into a routing protocol packet in place of the value of a hop number nor determining a router having the maximum link bandwidth and a minimum traffic load.

Hiroyuki does not remedy the deficiencies of Matthews, Verbiest, and Larsson.

Claims 10 and 20 are allowable at least for the reasons claims 1-6, 10-15, 18, 20, 21, and 23-27 are allowable.

The Patent Office rejected claim 27 under 35 U.S.C. 103(a) as being unpatentable over Matthews in view of Verbiest and Larsson and further in view of Momosaki, U.S. Published Patent Application No. 2003/0119538.

Applicant's claimed invention "provides a routing protocol to enable a mobile node to bypass a heavily loaded node, and find a route having a larger bandwidth" (page 7, lines 8-12, of Applicant's specification).

The Patent Office asserted that "Momosaki et al disclose estimating the amount of bandwidth needed in a system by determining the node's status (master or slave) and the number of the node's slaves" (page 11, line 16, through page 12, line 12, of the Final Office Action dated November 9, 2006) and cites paragraphs 0075-0076 of Momosaki as support. Although Momosaki, in paragraphs 0075-0076, does disclose "the upstream side device becomes a master and the downstream side device becomes a slave, and at most seven slaves can be connected to a single master," "it is possible to reduce the number of slaves that can be connected according to the necessary throughput," and "the number of slaves that can be connected is limited to at most four," Momosaki does not disclose or suggest "estimating includes considering a node's status and the number of the node's Slaves" (claim 6), "said first computer program code segment

considers a node's status and the number of the node's Slaves when estimating the link bandwidth of the node" (claim 16), nor "consideration of a number of, and the role played by, other nodes" (claim 27). Momosaki does not disclose that a node's status is considered in estimating.

Momosaki does not remedy the deficiencies of Matthews, Verbiest, and Larsson.

Thus, claim 27 is allowable over the prior art of record.

<u>Claims Not Rejected by Prior Art</u>

Claims 5, 6, 15, and 18 were not rejected by prior art. Thus, claims 5, 6, 15, and 18 are believed to contain allowable subject matter or to be allowable.

<u>Response to Response to Arguments</u>

In this section, as well as in the above paragraphs, the Patent Office's arguments found on pages 12-15 of the Final Office Action dated November 9, 2006.

With reference to page 12, line 18, through page 13, line 10, of the Final Office Action dated November 9, 2006, Verbiest does not disclose or suggest the claimed subject matter of calculating a connectivity metric defined as a ratio of the maximum link bandwidth to the estimated link bandwidth. Instead, in Verbiest, the estimated bandwidth, after being calculated, is compared to the maximum allowable bandwidth.

With reference to page 13, line 11, through page 14, line 3, of the Final Office Action dated November 9, 2006, none of Matthews, Verbiest, Momosaki, Larsson, or Hiroyuki disclose or suggest calculating a connectivity metric that is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth.

With reference to page 14, lines 4-11, of the Final Office Action dated November 9, 2006, neither paragraph 0006 nor 0051 of Hiroyuki discloses or suggests the limitation of inserting the value of the connectivity metric into a routing protocol packet in place of the value of a hop number nor determining a router having the maximum link bandwidth and a minimum traffic load. Matthews does not disclose or suggest calculating a connectivity metric that is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. Claims 10 and 20 recite that the connectivity metric is inserted into a routing protocol packet in conjunction with the value of a hop number in contrast to Hiroyuki's paragraph 0006 where a number of hops, bandwidth **<u>or</u>** the like are used and to Hiroyuki's paragraph 0051 where a constraint condition, in the singular,

is mentioned.

With reference to page 14, line 12, through page 15, line 4, of the Final Office Action dated November 9, 2006, claim 27 recites, in part, "estimating a link bandwidth of at least one network node in a wireless multi-hop network using at least in part a consideration of a number of, and the role played by, other nodes that are coupled to the at least one node, where the role comprises one of a master (M), a slave (S), and a participant in multiple piconet (PMP)." Momosaki, in paragraphs 0075 and 0076, does not disclose or suggest the claimed subject matter of "estimating a link bandwidth." Furthermore, none of Matthews, Verbiest, Momosaki, Larsson, or Hiroyuki disclose or suggest calculating a connectivity metric that is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth.

The Patent Office is respectfully requested to reconsider and remove the rejections of the claims under 35 U.S.C. 103(a) based on Matthews et al., in combination with Verbiest, Momosaki, Larsson, and/or Hiroyuki, and to allow all of the pending claims 1-6, 10-15, 18, 20, 21, 23-27, and 32-35 as now presented for examination. An early notification of the allowability of all of the pending claims is earnestly solicited.

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